

how far that width is occupied by solid ore, or how much it is intermixed with spar, talc and other matters\*. Also, on the continuity of branches of ore to a reasonable extent, or, on the other hand, on their being short and occurring at considerable intervals.

Again, the character of the lodes will have to be described,—whether beds conforming with the stratification of the country, or veins traversing the same.—Whether numerous, parallel to each other, or crossing.—What their direction usually is by the compass.—Whether vertical, or at what angle they deviate from being vertical.—Whether they are rich at particular places, as where veins intersect each other.—What is the character of the mineral matter, filling the lode where ore is deficient.—Whether this character is different, when near the surface, or when observed at greater depths.—What proportion of the lode appears to be metalliferous, and what barren.

*Facilities for working.*

Many considerations come under this head—character and habits of the natives—rate of payment for labor—state of roads and means of transport—supply of timber and other articles required—means of drainage, such as levels for obtaining adits—falls of water for machinery—streams whether constant and sufficient. As no mining operations upon an extended scale can be carried on without a command of cheap and good iron, I shall next advert to the mines and manufacture of this metal, and point out the peculiar advantages possessed by these mountains, over other parts of India, for improvements in that valuable branch of the natural resources of the country.

*September, 1838.*

III.—*Observations on six new species of Cyprinidæ, with an outline of a new classification of the family. By J. McCLELLAND, Esq., Bengal Medical Establishment.*

It is almost unnecessary to refer to the following passage which is inserted under the head of European correspondence, page 110, volume I. of this Journal, but it is so apposite to my subject that I must be excused for quoting it as it stands. “I spent some time in *Paris* this summer and saw a good deal of M. CUVIER. I used the freedom of mentioning your name to him and your desire of taking

\* In the western pergunahs, Captain HERBERT, in his geological report particularises grey, purple, and vitrious copper ore.

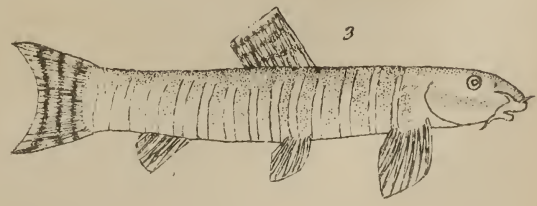
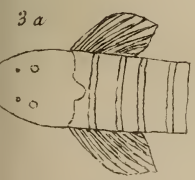
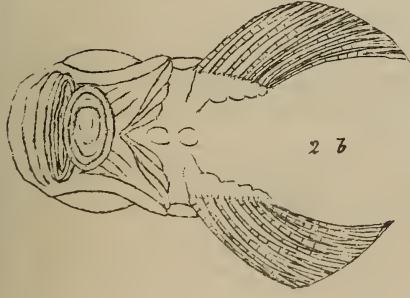
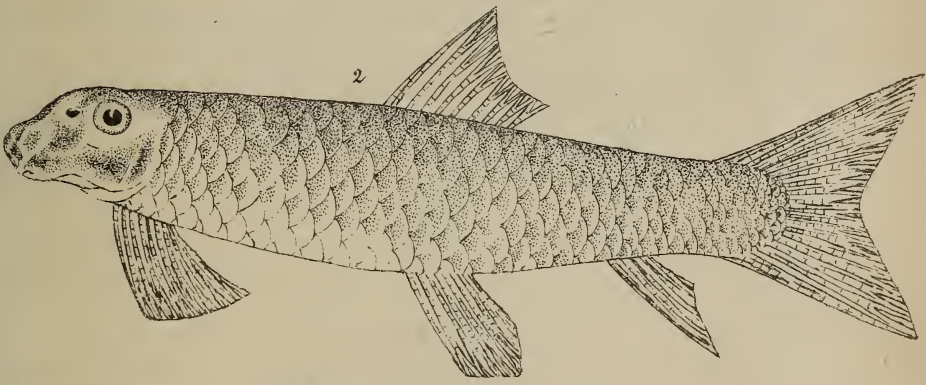
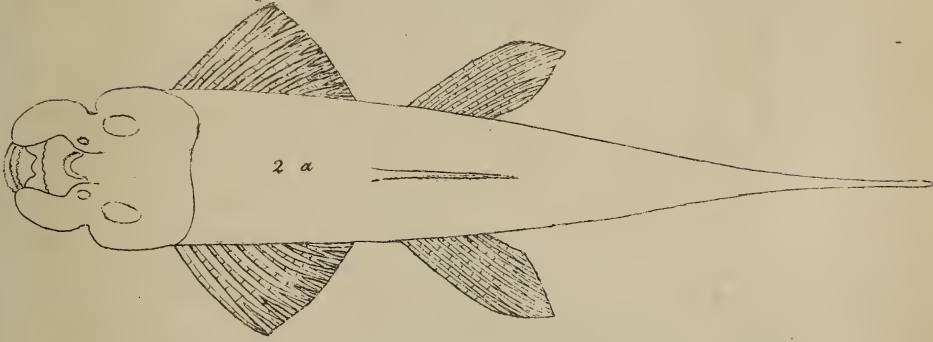
advantage of your position to forward the interests of science. I asked him if there was any particular object in natural history which I might suggest to you as a desideratum which could be supplied from India. He immediately replied emphatically 'ah certainement, les poissons d'eau douce;' he added that some gentleman in Calcutta had already sent him a good many of those of the lower rivers and parts of the country, but that they had no account of those of the higher parts."

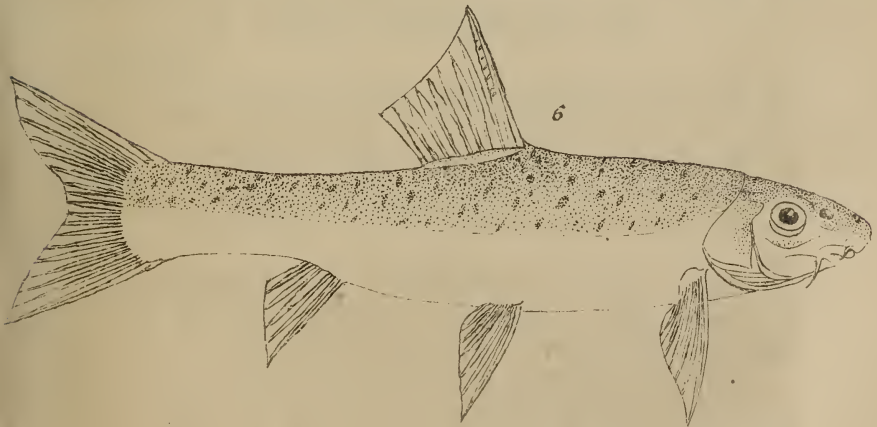
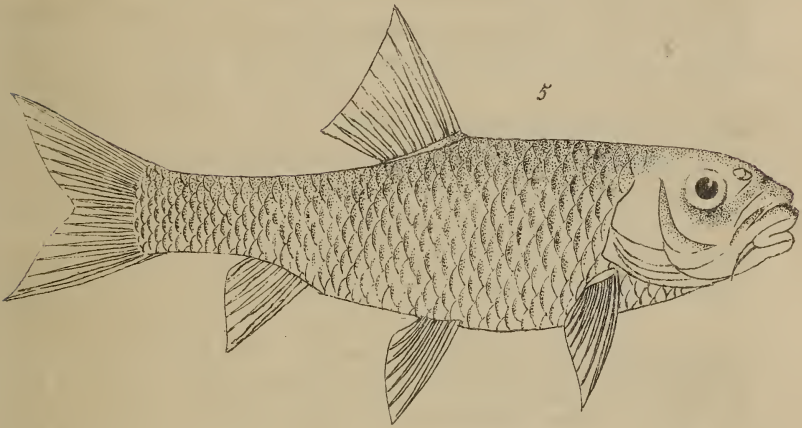
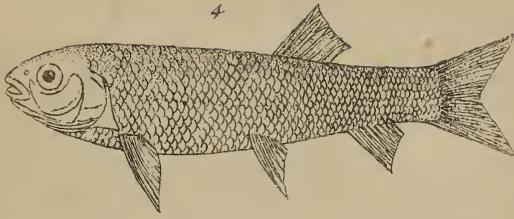
BUCHANAN states, that while engaged in the provinces remote from the sea he met with few species he had not before seen, but previous to his departure for Europe, on returning to the vicinity of the large estuaries he daily met with unknown species. In the large rivers above the influence of the tides he therefore supposed that not more than one species in five escaped his attention, while of those of the estuaries he had not described above one half. These last have recently engaged the attention of Dr. CANTOR, who during the season of 1836-7 accompanied the surveying expedition under Capt. LLOYD as medical officer, while I have been engaged in the former since my journey to Assam in 1835.

The results prove the accuracy of BUCHANAN's remarks, for while most of those obtained by Dr. CANTOR in the *Sunderbuns* have proved to be new, not more than one in five of the fresh water species inhabiting the large rivers in the interior, escaped the observation of BUCHANAN; but when we trace those rivers upwards from the commencement of the rapids into the mountains, the number of unknown forms augments in proportion to those that have been described, so that we may reverse the ratio given by BUCHANAN, and consider not more than one in five as having hitherto been made known, thus corresponding with CUVIER's notion 'that we have no accounts of those of higher parts.' Still, if CUVIER had been acquainted with the extent of BUCHANAN's labours on the subject, he would have seen that the whole of that author's *Garræ* are Alpine forms. This peculiar group which I have incorporated with the genus *Gonorhynchus* is fully described in the Gangetic fishes, but the drawings having been retained with the author's extensive collections of papers in every department of natural history at the library of the botanic garden, no figures of them were given to the public by BUCHANAN, and unfortunately CUVIER and other ichthyologists only adopted such of his species as were figured in the work referred to.

#### CYPRINIDÆ.

One dorsal fin, stomach without cæcal appendages, branchial membrane with few rays.







I. *Sub-fam.* PÆONOMIÆ, J. M.

Herbivorous.

Mouth slightly cleft, either horizontal or directed downwards; the stomach is a lengthened tube continuous with a long intestinal canal; colours plain, branchial rays three.

1. Gen. *Cirrhinus*. Lower jaw composed of two short limbs loosely attached in front where, instead of a prominent apex there is a depression; no spinous rays in the dorsal, lips soft, fleshy, and furnished with cirri.

Sub-gen. *Labeo*, Cuv. Cirri small or wanting.

2. Gen. *Barbus*. Lower jaw composed of two lengthened limbs united in front, so as to form a smooth narrow apex. Dorsal fin preceded by a strong bony spine, lips hard, four cirri, intermaxillaries protractile.

Sub-gen. *Oreinus*, J. M. Mouth vertical, lower jaw shorter than the upper, snout muscular and projecting, suborbitar plates concealed.

3. Gen. *Cyprinus prop.* Body elevated, lower jaw short and rounded in front, lips hard, thick, and without cirri; dorsal long.

4. Gen. *Gobio*. Dorsal placed over the ventrals and like the anal short, and without spines. Lower jaw shorter than the upper, and either round or square in front; lips thin and hard.

5. Gen. *Gonorhynchus*. Mouth situated under the head which is long and covered with thick integuments. Body long and sub-cylindrical, snout often perforated by numerous mucous pores. Dorsal and anal short, opposite, and without spines.

II. *Sub-fam.* SARCOBORINÆ, J. M.

Carnivorous.

Mouth directed upwards, widely cleft and horizontal, with a bony prominence more or less distinct on the symphysis of the lower jaw, serving as a prehensile tooth. Colors bright, disposed in spots and streaks, or displaying a uniformly bright lustre. The stomach is a lengthened sack ending in a short abdominal canal. Branchial rays three.

1. Gen. *Systemus*, J. M. Intermaxillaries protractile; dorsal and anal short, the former opposite to the ventrals. Body elevated and marked by two or more distinct dark spots. Diffuse bright spots either on the fins or opercula, prominence on the jaw obscure; scales large.

2. Gen. *Abramis?* Cuv. Body short and elevated, a short dorsal is placed opposite to the ventrals, anal long. Intestine of the only Indian species short as the body.

3. Gen. *Perilampus*, J. M. Head small, obliquely elevated above

the axis of the body. Dorsal opposite the anal which is the longer fin; apices of the jaws raised to a line with the dorsum which is straight, while the body below is much arched. Sides often streaked with bright colors, particularly blue, abdominal tube small, and little longer than the body.

4. Gen. *Leuciscus*. Dorsal small, opposite the ventrals, mouth and head horizontal and placed in the axis of the body, scales and opercula covered with a silvery pigment.

5. Gen. *Opsarius*, J. M. Mouth widely cleft; body slender and usually marked with transverse green bars or spots. Dorsal small, without spines and placed behind the middle; anal long. Intestinal canal very short and extending straight from the stomach to the vent.

### III. Sub-fam. APALOPTERINÆ, J. M.

Body elongated; sub-cylindric, and enveloped in mucous; all the fin rays soft; intestines short. Branchial rays vary from two to six.

#### 1. Gen. PÆCILIANÆ, SCHN.

Sub-gen. *Aplocheilus*, J. M. Head flat, with the eyes placed on its edges, and the mouth broad and directed upwards, with a single row of minute teeth placed along the edges of the jaws; caudal entire.

2. Gen. *Platycara*, J. M. Head flat, with the eyes placed on its upper surface, fins thick and opaque. Pectorals large, anal small, caudal bifid, mouth without teeth and directed downwards. Stomach and intestine form a continuous fleshy tube little longer than the body.

3. Gen. *Psilorhynchus*, J. M. Muzzle elongated and flattened, eyes placed far back on the edges of the head, mouth small and suctorial, without cirri, opercula small, caudal bifid, dorsal opposite to the ventrals.

#### COBITIS, LINN.

Head and body elongated and little compressed or elevated, the snout is long, directed obliquely downwards, and projecting slightly in front of the mouth, which is surrounded with short muscular filaments.

4. Gen. *Cobitis propria*, J. M. Caudal entire, large, and ornamented with bars or spots; prevailing colour various shades of brown disposed in more or less dense nebulæ.

5. Gen. *Schistura*, J. M. Caudal bilobate, prevailing colors green, usually disposed in zones and cross-bars.

It would be unnecessary here to offer any remark on the foregoing outline of the arrangement to which I have resorted in this family, with the view of introducing our Indian species to such groups as might harmonise with those of the Regne animal. This task however easy it may seem was one that could only be attempted after long study in

India, since CUVIER himself in referring such of BUCHANAN'S species as are figured in the Gangetic fishes to his groups, generally misplaces them even according to his own principles, for want of sufficient information regarding their forms, to say nothing of habits and structure; and there can be no doubt that if CUVIER had been possessed of sufficient knowledge of our Indian species he would have subdivided the family and characterised its groups nearly as I have done.

In collecting materials I have hitherto been chiefly indebted to Mr. GRIFFITH. I have now however to acknowledge my obligation to Dr. MACLOED, Inspector General of H. M. hospitals, whose collection consists of six different kinds caught promiscuously in the streams at *Simla*, and these form as many species not before known, thus promising an unprecedented accession of undescribed forms in this quarter, as well as along the whole line of the *Himálaya*, when a more diligent search has been made for them: and it is this circumstance that induces me to publish these species at once, rather than keep them back for the more copious details of the family now in course of publication. To those who are desirous of contributing to this interesting branch of natural history, which has been hitherto so much neglected, or I should rather say, suppressed in India, I may remark that specimens are always more satisfactory than drawings, however carefully executed; that larger fishes may be skinned and prepared with arsenical soap as easily if not more so than any other animals, and that the smaller kinds, provided not more than half a dozen be put in a quart bottle of good bazar spirits, will keep during a journey in the cold season from the most distant parts of India. Should specimens exceed the size of the finger, their skins may be thrown into spirits in which state the chance of their arriving safe will be more secure; notes regarding their habits and the parts removed will render such specimens of still higher value.

*Fam.* CYPRINIDÆ, Cuv.

*Sub-fam.* PÆONOMINÆ, J. M. Gen. *Barbus*.

Species, *Barbus Chielynoides*\*, J. M. Pl. LVI. f. 2. As. Res. XIX.  
Pl. LVII. f. 5.

Length of the head to that of the body as one to two and a half, intermaxillaries protractile, lips round, smooth, and thick with four cirri. Branchial rays large, and ascend behind as high as the base of the pectorals; the suborbital bones are concealed beneath thick integuments. The body contracts suddenly in depth under the base of the dorsal and over that of the anal fin, 33 scales in length along the lateral

\* From *Χελυνοιδης*, that has thick lips.



line, each marked with a black spot at the apex, and nine in an oblique row from the base of the ventrals to the dorsum. The fin rays are D. 10, the three first spinous, united and smooth, P. 16 small, V. 9 larger than the rays of the pectorals, A. 7, C. 18.

The stomach and intestine form a small continuous canal equal to about thrice the length of the body.

Habitat, mountain streams at *Simla*†.

The blunt form of the head and general sculpture of the body, the size and markings of the scales afford a resemblance to *Cyp. chedra*, BUCH. (*Leucis-brachialus*.)

*Sub-gen.* OREINUS\*, J. M.

The following species of this sub-genus which Dr. MACLOED obtained at *Simla*, corresponds in its general characters with *Barbus guttatus*, J. M. As. Res. XIX. Pl. XXXIX. f. 1. before obtained by Mr. GRIFFITH at *Panuku* in *Butan*, but they differ from each other in specific characters. There can be no question about the propriety of separating them from the true *Barbels*, now that a second species has been found in a similarly elevated position, 1000 miles from the locality of the first. Their spotted bodies, minute scales, fleshy snout, by means of which the actions of the mouth are entirely performed, mark them as different from the ordinary *Barbels*, while their comparatively short intestinal canal and serrated dorsal spine, remove them still further from *Gonorhynchus*.

Species, *Oreinus maculatus*, J. M. Pl. LVI. f. 3. Length of the head to that of the body as one to three and a half; body marked with shapeless spots dispersed irregularly on the back. The three first rays of the dorsal are spinous, and the third serrated behind. The fin rays are, D. 11: P. 18: V. 10: A. 5: C. 19.

Intestinal canal capacious, and forms one continuous tube with the stomach altogether about four lengths of the body, containing a copious green matter probably vegetable.

Habitat, mountain streams at *Simla*†, where it attains six or eight inches in length.

The anal fin of the *Butan* species contains ten rays, while that of the *Simla* species contains but five. The spots on the first are round and distributed over every part of the body and fins, but Mr. GRIFFITH observes, that they disappear on large individuals or become faint.

\* From *Oreinos*, pertaining to mountains.

† Found by Dr. MACLOED.



II. *Sub-fam.* SARCOBORINÆ, J. M.

## 3. Gen. PERILAMPUS, J. M.

Species, *P. elingulatus*, J. M. Pl. LVI. f. 1.

Head and fore part of the body deep, humeral plates slightly exposed behind the opercula, snout round and terminates abruptly in front of the eyes; about 46 scales along the lateral line, eleven in an oblique row from the base of the ventrals to the dorsum. The prominence on the apex of the lower jaw very minute, colors plain, a minute black dot at the apex of each scale. The fin rays are, D. 9: P. 13: V. 9: A. 10: C. 19.

The stomach and intestine together form a tube about the length of the body.

Habitat, mountain streams at *Simla*\*—length two inches.

The only remarkable thing about this species is, that the tongue which is usually much developed and rugous in the other *Perilamps* appears to be almost wanting in this species, which may lead us to infer that it differs in habit from the *Perilamps* of the Plains which are all insectivorous.

III. *Sub-fam.* APALOPTERINÆ, J. M.2. Gen. PLATYCARA, J. M. (*Balitora*, GRAY.)Species, *P. nasuta*, J. M. Pl. LV. f. 2, a. b.

Snout abruptly depressed between the eyes with a large pit between the nostrils, body strong and sub-cylindric, about 34 scales along the lateral line and eight in an oblique row from the base of the ventrals to the dorsum. The fin rays are, D. 10: P. 16: V. 9: A. 6: C. 15.

Habitat, *Kasya* mountains†—length six inches.

This species differs essentially from either of those figured in HARDWICKE's Illustrations, vide As. Res. XIX. Pl. XLIX. fs. 1, 2; a species corresponding, I suspect, with *Balitora maculata*, GRAY, was found by Mr. GRIFFITH in *Butan*; from that specimen, which unfortunately was much injured when it arrived in Calcutta, I have only collected a few particulars regarding the abdominal viscera in addition to the information regarding its habits obtained by Mr. GRIFFITH.

## V. Gen. SCHISTURA, J. M.

Species, *S. montana*, J. M. Pl. LV. f. 1.

Depth of the body to its length as about one to eight, six cirri and a single suborbital spine under each eye, a black streak at the base of the caudal, and about twelve broad streaks crossing the body; with one row of black dots crossing the dorsal rays, and a faint row crossing

\* Found by Dr. MACLOED.

† Found by Mr. GRIFFITH.

those of the caudal. Pectorals and ventrals long and lanceolate. The fin rays are D. 8 : P. 10 : V. 8 : A. 6 : C. 18.

Habitat, mountain streams at *Simla*\*. Length two and half inches. Species, *S. rupecula*, J. M. Pl. LV. f. 3, a. b.

About fourteen broad bars on either side, and three across the caudal and dorsal ; without suborbital spines, six cirri, four in front, and one at each corner of the mouth. The third ray from the upper and lower margins of the caudal a little longer than the outer ones. Lower surface of the body and head nearly flat, pectorals and ventrals lanceolate.

The fin rays are D. 8 : P. 10 : V. 8 : A. 7 : C. 16.

Habitat, mountain streams at *Simla*†. Length two inches.

The air vessels of *Schituræ* I have found in a bilobate case, rather perhaps cartilaginous than bony, placed over the entrance to the œsophagus : a magnified figure of this case is given, As. Res. XIX. Pl. LV. f. 4, while the natatory bladder of the true loaches, *Cobitis propria*, is contained in an oval bony case of only one lobe or cell (fig. 5, loc. cit.) also placed over the entrance of the œsophagus, where from its prominence as well as the minute spines with which its surface is covered it may probably perform some function connected with deglutition.

IV.—*Report upon the Coal beds of Assam. (Submitted to Government by the Committee appointed to investigate the Coal and Iron resources of the Bengal Presidency, as a supplement to their first printed report.)*

Capt. VETCH in a letter to the commissioner of Assam, dated 25th November, 1837, mentions having found detached specimens of various kinds of coal in the *Jellundee Belseeree*, and *Booroolee* rivers that fall into the *Bramaputra* from the *Butan* mountains between the 92° and 93° degrees of east longitude : at various distances from 14 to 20 miles from their confluence with the main river, and not far from the foot of the mountains.

The situations in which these specimens were found by Capt. VETCH are marked by the letters A, B, C, on the annexed sketch-map of the coal districts in Assam.

The great number of more advantageous situations in which coal has been found in Assam renders the question as to the quality and precise situations of the beds respectively from whence Capt. VETCH's specimens were obtained, a matter of secondary importance, but a proof so unquestionable of the existence of coal at different points for an extent

\* Found by Dr. MACLOED.

† Found by Dr. MACLOED.